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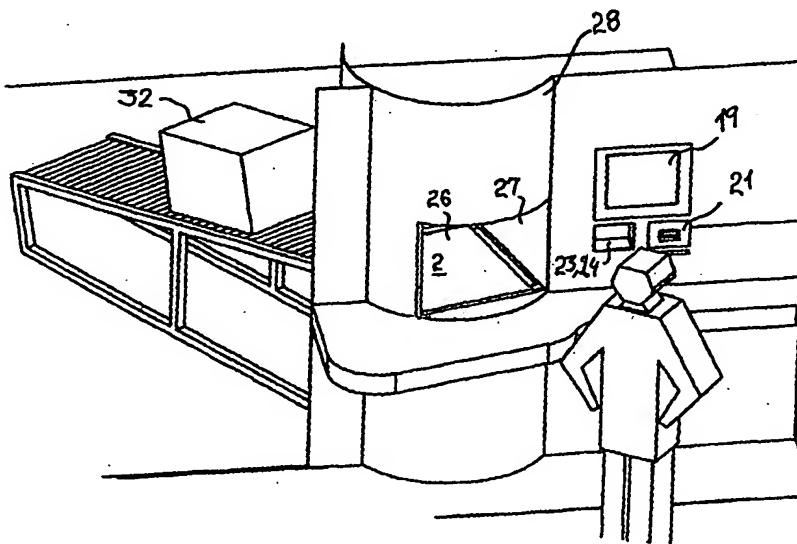
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(54) Title: A POSTAL ITEM CHECK-IN SYSTEM



## (57) Abstract

A system to be used for postal customers for automatic check-in of postal items and a method of using such system is described. The system has access to a database of valid postal delivery addresses and the system validates an address given by the customer and may in particular assist the customer in finding a correct postal delivery address. The address is printed and attached to the postal item. The system allows the customer to pay with cash and/or with credit card. Optionally, a machine-readable code is attached to the postal item comprising an identification code for that particular item. An important aspect is an item receiving unit having a pivotally arranged cylinder shell with an opening that may be aligned with an opening in a front plate in a receiving position or may be turned to a discharge position wherein the shell closes the opening in the front plate.

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## **A POSTAL ITEM CHECK-IN SYSTEM**

The present invention relates to a system to be used for postal customers for automatic check-in of postal items, in particular parcels and a method of using such system. The system allows the customer to pay for the postal service with cash and/or with credit card or payment card. The system has access to a database of valid postal delivery addresses and the system validates an address given by the customer and may in particular assist the customer in finding a correct postal delivery address. The address is printed by the system and is attached to the postal item.

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Optionally, a machine-readable code is attached to the postal item comprising an identification code for that particular item.

An important aspect is an item receiving unit having a pivotally arranged cylinder shell with an opening that may be aligned with an opening in a front plate in a receiving position or the shell may be turned to a discharge position wherein the shell closes the opening in the front plate.

### **Background of the invention**

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Automated check-in systems for postal items by which the item is weighted and postage is applied to it and paid for are known from the prior art and are disclosed in US 4,940,887, in US 5,313,404 as well as in US 5,570,290. A system is disclosed in US 5,586,037 which is able to print a destination code and/or a delivery address on a postal item or on a label to be applied to the item.

A system for validation of written delivery addresses of postal items that have been checked in into the postal delivery system by scanning the written address, use optical character recognition and compare the obtained information with a database of valid delivery addresses is known from US 5,770,841. A postal employee is referred to by the system in case of a mismatch.

It is an advantage for the efficiency of the postal delivery system if the customer is referred to in case of a mismatch, so that the number of postal items within the postal delivery system having an invalid address is delimited. It is also an advantage for the

customer to obtain assistance in finding the full and valid delivery address for a postal item when the customer do not know the full address or the correct spelling of personal names, street names or postal area codes etc.

- 5 Thus, it is an object of the present invention to provide a system for postal customers to perform an automated check-in of postal items in which the item is weighted and the customer pays for the postal service, the customer communicates a postal delivery address to the system which validates the address against a database of valid postal delivery addresses and supply the address in a printed form to be applied to the postal  
10 item.

It is a further object of the present invention to provide a system which can assist the customer in selecting a valid postal address from an input from the customer comprising only part of a postal address.

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It is a still further object of the present invention to provide a system which can assist the customer in selecting a valid postal address even if part of the customer input is erroneous.

- 20 It is a yet still further object of the present invention to provide a system which can supply a machine-readable code to be applied to the postal item.

- It is a yet still further object of the present invention to provide a system which can allocate a unique postal item identification code to each postal item being checked in at  
25 the system and which is enabled to communicate this identification code together with the validated delivery address to a remote computer system.

### **Description of the invention**

- 30 The present invention relates to a postal item check-in system comprising  
a control unit having a central data processing unit, data storage means,  
means for communicating information to a customer, and means for receiving  
information from a customer to the control unit,  
the system further comprising

a payment device for receiving payment from a customer, the operation of said payment device being controlled by the control unit, and

a printing device for printing a postal delivery address, the operation of said printing device being controlled by the control unit,

- 5 the control unit being enabled to look up delivery addresses in a database comprising valid postal delivery addresses, validate a user-provided address, and control the operation of the printing device according to the validated address.

The system may further be equipped with a weighting unit that is adapted for providing an  
10 output indicating the weight of a postal item placed at a weighting position of said unit to the control unit. Preferably, the weighting unit comprises conveying means for transporting the postal item to and from the weighting position and drive means for driving the conveying means, the operation of the drive means being controlled by the control unit. The weight of the postal item, such as a parcel, may be used by the control unit to  
15 compute the postage for the postal item, to reject items that are above a certain weight limits, as a criterion for a pre-sorting of the postal items that have been checked in, etc.

The payment device may comprise a card reader for reading information from credit cards and/or be enabled to receive bank notes and/or coins. In preferred embodiments of the  
20 present invention, the system is able to receive all the mentioned types of payment.

The printing device may be able to print machine-readable codes such as barcodes either directly on the postal items or on an adhesive label to be placed on the postal item by the customer or by means of an application device. The printing device may further be able to  
25 provide franking for the postal item.

The printing device comprises preferably means for positioning adhesive labels relatively to a printer unit of the printing device so that the printer unit prints on the adhesive label. The delivery address and if enabled a barcode and/or franking is printed on the label and  
30 is placed on the postal item by the customer. Alternatively, the system comprises a device for applying the adhesive label to the postal item.

As an alternative or supplement to the adhesive labels, the printing device may also comprise means for printing the delivery address and/or a barcode and/or franking directly  
35 on the surface of the postal item.

The system may also comprise a printing device for printing receipts to the customer. The receipts may be for the payment alone or also as a document proving the check-in of a parcel for a given delivery address at a given time, optionally also an insurance document  
5 in case the parcel has been insured.

It is an advantage if the control unit is enabled to connect at least temporarily to a data communication network so as to enable the control unit to communicate data with remote computer systems. The communication may enable the control unit to communicate with  
10 a remote computer system being able to validate credit card data so as to enable the control unit to validate a credit card being entered into the credit card reader.  
Furthermore, the control unit may be enabled to communicate with a remote computer system being able to charge credit card accounts, so that the control unit is able to initiate charge of a credit card account so as to enable the control unit to receive credit card  
15 payment. Alternatively or additionally, the control unit may be able to communicate with a remote computer system having a database comprising valid postal delivery addresses.

In particular, the control unit may according to the present invention allocate a unique identification code to each of the postal items being checked in at the system, the control  
20 unit being able to communicate said identification code and the corresponding valid delivery address of each of said postal items to a remote computer system. The postal item is thereby entered into a general postal item handling system covering a larger geographical area such as a nation or a number of nations of which area the valid postal delivery addresses are included in the database in which the system looks up addresses.

25 The system may furthermore comprise means for applying a machine-readable code to each of the postal items being checked in at the system. The machine-readable code may be such as a barcode or another optically detectable code, a RFID (Radio Frequency Identification) tag, etc. The machine-readable code preferably provides a significant  
30 indication of the unique identification code.

The control unit may in a preferred embodiment of the invention be able to use the database comprising the valid postal delivery addresses to suggest one or more valid postal delivery addresses to the customer based on partial address information received  
35 from the customer. It may even be able to suggest one or more valid postal delivery

addresses to the customer if part of the information received does not comply with a valid postal delivery address comprised in the database.

- In a particular embodiment of the present invention, the system comprises an item
- 5 receiving unit that in itself is an invention that may be used for check-in of postal items as well as other items, for which it is an advantage that customers may hand-in or deposit items, in particular at airports, at which the possible safety details that will be described below would be of great importance. Thus, an embodiment of the invention regards a system as described above and comprising an item receiving unit having
- 10 a cylinder shell part defining an interior cavity of said part, the shell part having an opening defined therein for allowing postal items to pass between the exterior and the interior of said part, the cylinder shell part being arranged pivotally about a substantially vertical axis of symmetry of said cylinder shell part,
- a front plate part being fixedly arranged and having an opening defined therein for
- 15 allowing postal items to pass the front plate part,
- the cylinder shell part and the front plate part being arranged in close proximity in such a way that the openings of said parts at a receiving angular position of the cylinder shell part are aligned so as to allow for postal items to pass both openings and so that the opening of said front plate part at one or more discharge angular positions of the cylinder shell part
- 20 is closed by the cylinder shell part,
- the item receiving unit further having drive means for turning the cylinder shell part between said angular positions, the operation of the drive means being controlled by the control unit.
- 25 The weighting unit is preferably arranged within the interior cavity of the cylinder shell part and may in particular be arranged pivotally about the same axis as the cylinder shell part and the weighting unit has a fixed angular position relatively to the cylinder shell part. The conveying means of the weighting unit may comprise an endless belt being arranged movably in a direction perpendicular to the opening defined in the cylinder shell part, the
- 30 endless belt defining a substantially horizontal surface for supporting postal items.

The front plate part towards the cylinder shell part has in an advantageous design of the item receiving unit an inner surface shaped as a concave cylinder section of a radius being substantially equal to the outer radius of the cylinder shell part. The inner surface of

35 the front plate part may, at least in one angular direction from the opening defined in the

front plate part, extends over an angle being at least the size of the angle of the opening defined in the cylinder shell part, so that the inner surface at least at one angular position of the cylinder shell part covers the opening defined in the cylinder shell part.

An aspect of the present invention regards a general item check-in system comprising

- 5           a control unit having a  
                    central data processing unit,  
                    data storage means,  
the system further comprising  
                    an item receiving unit having
- 10           a cylinder shell part defining an interior cavity of said part, the shell part having an opening defined therein for allowing items to pass between the exterior and the interior of said part, the cylinder shell part being arranged pivotally about a substantially vertical axis of symmetry of said cylinder shell part,  
                    a front plate part being fixedly arranged and having an opening defined therein for
- 15           allowing items to pass the front plate part,  
the cylinder shell part and the front plate part being arranged in close proximity in such a way that the openings of said parts at a receiving angular position of the cylinder shell part are aligned so as to allow for items to pass both openings and so that the opening of said front plate part at one or more discharge angular positions of the cylinder shell part is
- 20           closed by the cylinder shell part,  
                    the item receiving unit further having drive means for turning the cylinder shell part between said angular positions, the operation of the drive means being controlled by the control unit.
- 25           The general system may further comprise a weighting unit arranged within the interior cavity of the cylinder shell part and being adapted for providing an output indicating the weight of a item placed at a weighting position of said unit to the control unit, the weighting unit comprising conveying means for transporting the item to and from the weighting position and drive means for driving the conveying means, the operation of the
- 30           drive means being controlled by the control unit. The weighting unit is preferably arranged pivotally about the same axis as the cylinder shell part and the weighting unit has a fixed angular position relatively to the cylinder shell part. The conveying means of the weighting unit may further comprise an endless belt being arranged movably in a direction perpendicular to the opening defined in the cylinder shell part, the endless belt defining a
- 35           substantially horizontal surface for supporting items.



The front plate part towards the cylinder shell part has preferably, as for the postal check-in system, an inner surface shaped as a concave cylinder section of a radius being substantially equal to the outer radius of the cylinder shell part. The inner surface of the front plate part may at least in one angular direction from the opening defined in the front plate part extends over an angle being at least the size of the angle of the opening defined in the cylinder shell part, so that the inner surface at least at one angular position of the cylinder shell part covers the opening defined in the cylinder shell part. Thereby the customer is provided from being able to gain any kind of access to the area behind the front plate, which for safety reasons may be very valuable for an automatic luggage check-in system of an airport and the like. The herein described general check-in system may also comprise the elements described above as being parts of the postal item check-in system. A luggage check-in system may also comprise a ticket reader or the like by means of which a customer/passenger may identify him or herself to the control unit and the printer device may print a luggage receipt to the customer.

The present invention also regards a method of operating systems as described above, which method is to a large extent obvious from the description above and the examples below. In particular, the method of performing customer check-in of postal items according to the invention comprises the following steps:

- the customer enters the postal item into an item receiving unit,
- the customer communicates at least partial information about a postal delivery address to a control unit,
- the control unit searches a database comprising valid postal delivery addresses and suggest one or more addresses to the customer, which addresses comply at least partially with the information from the customer,
- the customer acknowledges one of the suggested addresses,
- the customer pays for the postal service using a payment device of the system,
- and
- a printing device controlled by the control unit prints the valid and acknowledge delivery address.

The item receiving unit may further comprise a weighting unit on which the customer enters the postal item, where after the weighting unit determines the weight of the postal item and communicates data indicating said weight to the control unit.

The method comprises also in a preferred embodiment the following steps:

- the printing device prints the address on an adhesive label,
- the label is delivered to the customer, and
- 5 the customer applies the label to the postal item.

The payment step may comprise the steps of:

- the customer enters a credit card into a credit card reader,
- the control unit communicates with a remote computer being able to validate credit
- 10 cards over a data communication network so as to validate the entered credit card, and
- the control unit accepts payment with the credit card in case it is found to be valid.

The payment step may further comprise the following steps:

- the control unit communicates with a remote computer being able to charge credit
- card accounts over a data communication network, and
- 15 the control unit initiates charge of the account related to the entered credit card so
- as to perform a payment procedure.

The method may also comprise the following steps:

- the control system allocates a unique identification code to each of the postal
- 20 items being checked in at the system, and
- the control system communicates the unique identification code and the
- corresponding valid delivery address of each of said postal items to a remote computer
- system over a data communication network.

- 25 It is also advantageous if the method according to the present invention further comprises the following step:

- the system provides a machine-readable code to be attached to each of the postal items being checked in at the system.

- 30 In case the system to be operated comprises the above-mentioned item receiving unit the method furthermore may comprise the steps of

- turning a cylinder shell part by means of drive means controlled by the control unit
- about a substantially vertical axis of symmetry of said cylinder shell part so that an
- opening defined therein is aligned with an opening defined in a front plate part that is

- 35 fixedly arranged,

entering the postal item through said openings into an interior cavity defined by the cylinder shell part,

turning the cylinder shell part about an angle so that the opening defined in the cylinder shell part is aligned with one of at least one discharge stations and so that the  
5 opening defined in the front plate is closed by the cylinder shell part, and  
discharging the postal item from the interior cavity to discharge station.

An endless belt is preferably arranged pivotally about the same axis as the cylinder shell part and has a fixed angular position relatively to the cylinder shell part, the endless belt  
10 being movable in a direction perpendicular to the opening defined in the cylinder shell part and defining a substantially horizontal surface for supporting postal items so that the postal item is discharged from the interior cavity by driving the endless belt by means of drive means controlled by the control unit.

15 In a most preferred embodiment of the method according to the invention, the weighting unit is arranged in the interior cavity for determining the weight of postal items placed on the endless belt.

#### **Brief description of the figures**

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Fig. 1 is a diagram of a parcel check-in system according to the invention,

Fig. 2 shows the customer front-end of the system,

25 Fig. 3 shows four positions of a receiving unit for receiving items,

Fig. 4 shows four positions of a receiving unit similar to the one of Fig. 3 but with a different design of the front plate part,

30 Fig. 5 shows four states of operation of a conveyor belt with photo cells for receiving items,

Fig. 6 shows a perspective view of a check-in system comprising the receiving unit of Figs. 3 and 4, and

35

Fig. 7 is a diagram showing the main components of the control unit.

**Detailed description of the figures**

The parts of a parcel check-in system according to the invention are shown on the diagram in Fig. 1. The system comprises an inlet conveyor belt section 1, a static weighting section 2 having a conveyor belt, the weighting section 2 being able to provide an electronic output indicating the weight of an article placed on the belt, and an accumulating conveyor section 3 for receiving and temporarily storing parcels from the weighting section 2, the three section 1-3 being arranged in series. Each of the three sections 1-3 comprises a drive unit, an asynchronous electric motor, for driving the article conveying means of the respective section. The weighting section 2 is preferably placed in an area to which customers do not have access.

The operation of the system is controlled by a control unit 4, which is a multiple-purpose computer having a central processing unit, data storage means and data communication means 5-10, and being provided with suitable computer software stored in the data storage means for controlling the operation of the computer. The control unit 4 has data communication means 5-7 being adapted for transferring data for controlling the operation of the drive units of the three sections 1-3 and for receiving data from sensors arranged along the sections 1-3. It further has data communication means 8, 9 being adapted for transferring control data from the control unit 4 to a label printer 11 and to a receipt printer 12, respectively, and for transferring status data from the label printer 11 and the receipt printer 12 to the control unit 4. The system comprises a payment unit 13 for receiving payment from the customers in the form of a machine-readable credit card or payment card, and optionally also in the form of bank notes and/or coins, as well as a data communication means 10 associated with the payment unit 13 for transferring data back and forth between the payment unit 13 and the control unit 4.

The control unit 4 is permanently or temporarily connected to a communication network 14, which may be a wide area network (WAN) by which the control unit 4 may communicate with remote external systems. The external systems shown are a postal central computer system 15 having a database containing all registered valid postal addresses within a given geographical area, such as one or more states, one or more countries, etc., and a look-up table connecting each active unique postal item

identification code with a valid postal address, an automatic maintenance system 16 which keeps the computer software updated/upgraded and monitors the operational state of the check-in system for errors, lack of supplies of labels etc., a test system 17 from which a remote on-line troubleshooting and diagnosing can be performed, and a credit  
5 card and/or payment card system 18 from which a validation of cards can be obtained and where the customers account can be charged.

The customer front-end shown in Fig. 2 has a monitor 19 and a keyboard 20 of the control unit 4 for providing means for communication between the system and the customer. The  
10 monitor has 19 optionally a touch-sensitive screen, thus making the keyboard 20 unnecessary. A card reader 21 for reading credit cards etc. is placed on the front-end for receiving payment from the customers, and the front-end optionally also has a unit for receiving bank notes and/or coins. An opening 22 is provided for entering parcels onto the inlet belt conveyor section 1. The opening 22 is preferably of a size so that parcels  
15 exceeding certain dimensions cannot be entered. In particular, the plane of the opening may be situated in a plate laying in a plane that is substantially parallel to the article-supporting plane of the inlet belt conveyor section 1 so that only parcels complying with the dimension requirements in all three dimensions may be entered into the system. Further, the front-end has openings 23, 24 through which the output from the label printer  
20 11 and the receipt printer 12, respectively, can be delivered to the customer. The printed label has the validated address printed on it and comprises a unique postal item identification code assigned to the particular parcel in a machine-readable form, such as a bar code, an RFID transponder, a series of alphanumeric characters to be read by Optical Character Recognition (OCR), etc. The application of the label on the parcel is performed  
25 by the customer but could instead be performed by an automatic applicator. However, at present such applicators are high-priced and their performance are not sufficiently reliable when dealing with irregularly shaped parcels.

The customer begins the operation of the parcel check-in system by placing a parcel onto  
30 the inlet belt conveyor section 1 through the associated opening 22 in the front-end of the system. The operation of the drive unit of the inlet belt conveyor section is started by the control unit 4 and the parcel is conveyed to the static weighting section 2 of which the drive unit is activated as well, until the parcel is at a correct position on the weighting section 2. The position of the parcel is controlled by a photocell, which is activated when

- the front end of the parcel reaches a given position along the weighting section 2. The photocell sends an output to the control unit 4 when it is activated so that the control unit can stop the operation of the drive units of the input conveyor section 1 and the weighting section 2 at an appropriate moment. Optionally, a number of photocells are arranged
- 5 around the weighting section 2 so that the dimensions of the parcel may be measured or at least controlled to be within a given set of limits. The weighting section 2 transmits an electronic output to the control unit 4 indicating the weight of the parcel. The control unit displays the measured weight to the customer on the monitor 19 and activates the drive means of the input belt conveyor section 1 and the weighting section 2 in a reverse
- 10 direction so as to convey the parcel back onto the input belt conveyor section 1. The position of the parcel on the input belt conveyor section 1 is controlled by a photocell which is activated and sends an output to the control unit 4 when the front end of the parcel reaches a given position along the input belt conveyor section 1.
- 15 The control unit 4 prompts via the monitor 19 the customer for entering a credit card into the card reader 21. The entered card is read by the card reader and the identification data of the card is transmitted to the control unit 4 which performs a validation procedure over the network with the credit card system 18. When the card is validated, the customer is prompted to enter the delivery address or at least part of the delivery address on the
- 20 keyboard. The control unit 4 has access to a database of valid postal addresses, either from the postal central computer 15 over the network or from a locally stored and regularly updated copy of the database. The control unit 4 can by using the database assist the customer in finding the correct address by proposing a number of valid addresses found in the database from deficient address information entered by the customer.
- 25
- The database of valid postal addresses may in a simple form comprise an index of valid street names for each district with a postal code, e.g. ZIP-code, optionally also valid house numbers and flat indications on those streets. More elaborate databases also comprise the names of the residents of those addresses. The database may also
- 30 comprise information about the mail route each postal address is designated to.

The validation of addresses and assistance for the user in finding a valid address depends on the specification level of the database employed. The assistance and validation system may be enabled to recognise faulty or alternative spelling of personal

names and street names so that the name "Smith" in a database search will be regarded as belonging to the group of "Smith, Schmidt, Smidth, Schmith, Schmitt, ....", etc. and be able to suggest one or more valid addresses from a limited number of information of which perhaps none are completely correct.

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The customer input device of system may additionally or alternatively to the keyboard or the touch-sensitive screen comprise means for speech recognition and/or an Optical Character Recognition system for scanning an address that is already written on the parcel.

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The customer may after having confirmed the address enter additional categorisation of the parcel, such as "fragile " or "express", enter the contents of the parcel and/or insure the parcel. The control unit 4 calculates the total charge and the customer confirms the amount and enters if required a PIN-code for the card. The control unit 4 charges the  
15 account of the entered card by communicating over the network with the credit card/payment card system 18.

The parcel is allocated a unique postal item identification code and the control system communicates the code together with the validated address, the identification code of the  
20 check-in system and the optional categorisation to the postal central computer system 15 in which it is added to the relevant database. The code is used for sorting of the parcels and for monitoring and tracking of the parcel through the postal parcel delivery system.

A label is printed on the label printer 11 and a receipt is printed on the receipt printer 12  
25 and the label and the receipt are delivered to the customer through the respective front-end openings 23, 24. The customer applies the adhesive label to the parcel and communicates to the system that the parcel is ready. The parcel is conveyed from the inlet belt conveyor section 1 to the weighting section 2 and the parcel is weighted again to ensure that the parcel have not been tampered with, e.g. been exchanged with a heavier  
30 parcel, and a scanner controls that the identification code is placed so that it actually is machine-readable. The parcel is then conveyed to the accumulating conveyor section 3 from where it is entered into the postal parcel delivery system.

The parcel may alternatively not be allocated a unique postal item identification code but instead have a machine-readable code printed on the label containing information about the partial or complete address and optionally also about the mail route the address is designated to, or the parcel may not be given a machine-readable code at all. Such a system do not necessarily have to be connected to a network, especially not if only payment means are accepted that do not require access to a central payment system 18, such as cash, cash cards or certain smart-cards.

Another embodiment of the parcel receiving part of the system is shown in Figs. 3 and 4 according to which the weighting section 2 is arranged within a pivotally arranged screen part 25 formed as a cylinder shell. The screen part 25 has an opening 26 defined therein for allowing parcels to be entered into the screen part 25 and onto the weighting section 2 and for allowing the parcels to be discharged again. A corresponding opening 27 is defined in the front plate 28 of the receiving part so that the two openings 26, 27 may be aligned in a receiving angular position of the cylinder shell screen part 25 as shown in Fig. 3 position A and in Fig. 4 position A.

Four positions of one embodiment of the system with a screen part 25 formed as a cylinder shell are shown in Fig. 3 as positions A, B, C and D. Position A is as mentioned above a receiving position in which the opening 26 of the screen part 25 is aligned with the opening 27 of the front plate 28 to allow a customer to enter a parcel to be checked in onto the weighting section 2 that is arranged within the screen part 25 in such a way that it is turned together with the screen part and the transport direction (indicated with an arrow 29) of the conveyor belt of the weighting section 2 constantly is perpendicular to the opening 26 in the shell part. In positions B, C and D, the screen part 25 is turned about its pivot axis, which is identical with the vertical symmetry axis of the cylinder shell, by means of an electrical stepper motor that is controlled by the control unit to three different angular discharge positions in which the parcel that was placed on the weighting section 2 at position A may be discharged. The plurality of discharge positions allows for a pre-sorting of the parcels according to a set of criteria such as the dimensions of the parcels, the destination, express parcels, insurance of the parcels, parcels for courier service, etc. or a combination of such criteria. The pre-sorting can be very advantageous as the different types of parcels often are handled by means of different handling arrangements and accumulation space for the parcels may be utilised more efficiently if small parcels are



sorted into a bulk storage means such as a wire container or a mail bag so that they do not take up space on accumulation conveyors for larger parcels.

Four angular positions A-D of a screen part 25 arranged according to another embodiment of the invention are shown in Fig. 4. In this embodiment, the front plate 28 has an extension part 30 that on the inner side towards the screen part 25 is formed as a counterpart to the outer shape of the screen part 25 so that the two parts 25, 30 fit closely together. The extension part 30 extends over an angle that is at least equal to the angular size of the opening 26 defined in the screen part 25 so that the extension part 30 can cover said opening 26 and prevent that an opening is formed between the customer area and the area to which customers do not have access during the operation of the system. From the receiving position of the screen part 25 as shown in position A of Fig. 4, the screen part 25 is turned counter-clockwise towards one of the discharge positions. This operation is illustrated in positions B, C and D of Fig. 4, in which the screen part 25 is turned in incrementing angular steps from the receiving position. The opening 26 in the screen part 25 is partly aligned with the opening 27 in the front plate 28 at position B and C, and the remaining part of the opening 26 in the screen part 25 is covered by the extension part 30. At position D, the opening 26 in the screen part 25 is no longer aligned with the opening 27 in the front plate 28 and an opening is forming between the rear edge 31 of the extension part 30 and the opening 26 in the screen part 25. The screen part 25 may be turned to one, two or more different discharge stations arranged in the area to which customers do not have access. The number of discharge stations can not be more than two for the shown dimensioning of the parts of the system but the number may be three or more, depending mainly on the angular size of the opening 26 defined in the screen part 25 of the system.

An arrangement of photocells, R1, R2, D1, D2 in relation to the weighting section 2 and the operation of the section 2 in accordance with the output from the photocells R1, R2, D1, D2 is shown in Fig. 5. The weighting section 2 is shown in position A without a parcel present so that the two photocells R1, R2 at the receiving end of the section 2 as well as the two photocells D1, D2 at the discharge end of the section 2 are visible. The reference numbers for the photo cells R1, R2, D1, D2 are not included in positions B-D. A parcel 32 is entered onto the receiving end of the weighting section 2 in position B. The two photo cells R1, R2 at the receiving end are blocked off and the conveyor belt of the weighting section 2 is operated until the first photo cell D1 at the discharge end of the weighting unit

is blocked off which indicates to the control unit of the system, to which the output from the photo cells R1, R2, D1, D2 are directed, that the parcel 32 has reached a weighting position and the operation of the conveyor belt is halted as shown in position C. The longitudinal size of the parcel is measured at the same time based on the time between the second photo cell R2 at the receiving end is no longer blocked off and the first photo cell D1 at the discharge end is blocked off as well as the conveying speed of the belt. The second photo cell D2 at the discharge end of the weighting section 2 is used to ensure that the conveyor belt is not operated for too long a period, in which case the conveying direction may be reversed and the belt being operated until the photo cell D2 is no longer blocked off, and also to ensure that the parcels 32 are actually fully discharged from the section 2.

The photo cell D2 may also be used in case a long parcel 33 is entered onto the weighting section 2 as shown at position D. The parcel 33 illustrated with the continuous line has the maximum length allowable for the system and is in the correct weighting position blocking off two of the photo cells R2, D1. The two remaining photo cells R1, D2 are used to ensure that the parcel 33 is not too long and extends beyond the allowable limits of the weighting unit.

The control of the operation of main parts of the system is illustrated in Fig. 6. The control unit of the system is constituted by a Personal Computer (PC) having a central processing unit and data storage means comprising Random Access Memory (RAM) as well as a physical storage medium, a hard disc. The PC is connected to a Credit card reader for receiving payment from the customers, a modem for communicating with remote computer systems via a communication network, a UPS that ensures that the system is closed down properly in case of a power failure, a label printer for printing the delivery address on adhesive labels to be applied to the parcels by the customer and for printing receipts and a Touch-screen for interaction with the customer so that information from the control unit to the customer are shown on the screen and the customer can provide information input to the control unit by touching sensitive parts of the screen. The control of the drive means for driving the cross belt, or conveyor belt, of the weighting unit and possibly other conveyor belts, the control of the drive means for turning the cylinder shell shaped screen part 25 and the receiving of output from the photo cells R1, R2, D1, D2 is

performed via an RS 232/485 interface to a subsidiary control part ISD02 through which the actual control is performed.

A letter check-in system similarly to the described parcel check-in system can also be  
5 constructed according to the invention.

**CLAIMS**

1. A postal item check-in system comprising  
a control unit having a  
5                   central data processing unit,  
                  data storage means,  
                  means for communicating information to a customer, and  
                  means for receiving information from a customer to the control unit,  
the system further comprising  
10               a payment device for receiving payment from a customer, the operation of said  
payment device being controlled by the control unit, and  
                  a printing device for printing a postal delivery address, the operation of said  
printing device being controlled by the control unit,  
the control unit being enabled to look up delivery addresses in a database comprising  
15 valid postal delivery addresses, validate a user-provided address, and control the  
operation of the printing device according to the validated address.
2. A system according to claim 1 further comprising a weighting unit being adapted for  
providing an output indicating the weight of a postal item placed at a weighting position of  
20 said unit to the control unit.
3. A system according to claim 2, wherein the weighting unit comprises conveying means  
for transporting the postal item to and from the weighting position and drive means for  
driving the conveying means, the operation of the drive means being controlled by the  
25 control unit.
4. A system according to any of the preceding claims, wherein the payment device  
comprises a card reader for reading information from credit cards.
- 30 5. A system according to any of the preceding claims, wherein the payment device is  
enabled to receive bank notes and/or coins.
6. A system according to any of the preceding claims, wherein the printing device further  
is able to print machine-readable codes.

7. A system according to any of the preceding claims, wherein the printing device further is able to provide franking for the postal item.

8. A system according to any of the preceding claims, wherein the printing device  
5 comprises means for positioning adhesive labels relatively to a printer unit of the printing device so that the printer unit prints on the adhesive label.

9. A system according to claim 8 further comprising a device for applying the adhesive label to the postal item.

10

10. A system according to any of the preceding claims, wherein the printing device further comprises means for printing on the postal item.

11. A system according to any of the preceding claim and comprising a printing device for  
15 printing receipts to the customer.

12. A system according to any of the preceding claims, wherein the control unit is at least temporarily connected to a data communication network so as to enable the control unit to communicate data with remote computer systems.

20

13. A system according to claim 4 and 12, wherein the control unit can communicate with a remote computer system being able to validate credit card data so as to enable the control unit to validate a credit card being entered into the credit card reader.

25 14. A system according to claim 12 or 13, wherein the control unit can communicate with a remote computer system being able to charge credit card accounts, the control unit being able to initiate charge of a credit card account so as to enable the control unit to receive credit card payment.

30 15. A system according to any of claims 12-14, wherein the control unit can communicate with a remote computer system having a database comprising valid postal delivery addresses.

16. A system according to any of claims 11-15, wherein the control unit can allocate a  
35 unique identification code to each of the postal items being checked in at the system, the

control unit being able to communicate said identification code and the corresponding valid delivery address of each of said postal items to a remote computer system.

17. A system according to any of the preceding claims, wherein the system comprises  
5 means for applying a machine-readable code to each of the postal items being checked in at the system.

18. A system according to claim 17, wherein the machine-readable code provides a significant indication of the unique identification code.

10

19. A system according to any of the preceding claims, wherein the control unit is enabled to suggest one or more valid postal delivery addresses to the customer based on partial address information received from the customer.

15 20. A system according to claim 19, wherein the control unit is enabled to suggest one or more valid postal delivery addresses to the customer if part of the information received does not comply with a valid postal delivery address comprised in the database.

21. A system according to any of the preceding claims, wherein the system further  
20 comprising an item receiving unit having

a cylinder shell part defining an interior cavity of said part, the shell part having an opening defined therein for allowing postal items to pass between the exterior and the interior of said part, the cylinder shell part being arranged pivotally about a substantially vertical axis of symmetry of said cylinder shell part,

25 a front plate part being fixedly arranged and having an opening defined therein for allowing postal items to pass the front plate part,  
the cylinder shell part and the front plate part being arranged in close proximity in such a way that the openings of said parts at a receiving angular position of the cylinder shell part are aligned so as to allow for postal items to pass both openings and so that the opening  
30 of said front plate part at one or more discharge angular positions of the cylinder shell part is closed by the cylinder shell part,

the item receiving unit further having drive means for turning the cylinder shell part between said angular positions, the operation of the drive means being controlled by the control unit.

35

22. A system according to claim 3 and 21, wherein the weighting unit is arranged within the interior cavity of the cylinder shell part.
23. A system according to claim 22, wherein the weighting unit is arranged pivotally about  
5 the same axis as the cylinder shell part and the weighting unit has a fixed angular position relatively to the cylinder shell part.
24. A system according to claim 23, wherein the conveying means of the weighting unit comprises an endless belt being arranged movably in a direction perpendicular to the  
10 opening defined in the cylinder shell part, the endless belt defining a substantially horizontal surface for supporting postal items.
25. A system according to any of claims 21-24, wherein the front plate part towards the cylinder shell part has an inner surface shaped as a concave cylinder section of a radius  
15 being substantially equal to the outer radius of the cylinder shell part.
26. A system according to claim 25, wherein the inner surface of the front plate part at least in one angular direction from the opening defined in the front plate part extends over an angle being at least the size of the angle of the opening defined in the cylinder shell  
20 part, so that the inner surface at least at one angular position of the cylinder shell part covers the opening defined in the cylinder shell part.
27. An item check-in system comprising  
a control unit having a  
25 central data processing unit,  
data storage means,  
the system further comprising  
an item receiving unit having  
a cylinder shell part defining an interior cavity of said part, the shell part having an  
30 opening defined therein for allowing items to pass between the exterior and the interior of said part, the cylinder shell part being arranged pivotally about a substantially vertical axis of symmetry of said cylinder shell part,  
a front plate part being fixedly arranged and having an opening defined therein for allowing items to pass the front plate part,

the cylinder shell part and the front plate part being arranged in close proximity in such a way that the openings of said parts at a receiving angular position of the cylinder shell part are aligned so as to allow for items to pass both openings and so that the opening of said front plate part at one or more discharge angular positions of the cylinder shell part is

5 closed by the cylinder shell part,

the item receiving unit further having drive means for turning the cylinder shell part between said angular positions, the operation of the drive means being controlled by the control unit.

10 28. A system according to claim 27 further comprising a weighting unit arranged within the interior cavity of the cylinder shell part and being adapted for providing an output indicating the weight of a item placed at a weighting position of said unit to the control unit, the weighting unit comprising conveying means for transporting the item to and from the weighting position and drive means for driving the conveying means, the operation of  
15 the drive means being controlled by the control unit.

29. A system according to claim 28, wherein the weighting unit is arranged pivotally about the same axis as the cylinder shell part and the weighting unit has a fixed angular position relatively to the cylinder shell part.

20

30. A system according to claim 29, wherein the conveying means of the weighting unit comprises an endless belt being arranged movably in a direction perpendicular to the opening defined in the cylinder shell part, the endless belt defining a substantially horizontal surface for supporting items.

25

31. A system according to any of claims 27-30, wherein the front plate part towards the cylinder shell part has an inner surface shaped as a concave cylinder section of a radius being substantially equal to the outer radius of the cylinder shell part.

30 32. A system according to claim 31, wherein the inner surface of the front plate part at least in one angular direction from the opening defined in the front plate part extends over an angle being at least the size of the angle of the opening defined in the cylinder shell part, so that the inner surface at least at one angular position of the cylinder shell part covers the opening defined in the cylinder shell part.

35



33. A method of performing customer check-in of postal items, the method comprising the following steps:

- the customer enters the postal item into an item receiving unit,
- 5 the customer communicates at least partial information about a postal delivery address to a control unit,
- the control unit searches a database comprising valid postal delivery addresses and suggest one or more addresses to the customer, which addresses comply at least partially with the information from the customer,
- 10 the customer acknowledges one of the suggested addresses,
- the customer pays for the postal service using a payment device of the system,
- and
- a printing device controlled by the control unit prints the valid and acknowledge delivery address.

15

34. A method according to claim 33, wherein the item receiving unit comprises a weighting unit on which the customer enters the postal item, where after the weighting unit determines the weight of the postal item and communicates data indicating said weight to the control unit.

20

35. A method according to claim 33 or 34 and further comprising the following steps:
- the printing device prints the address on an adhesive label,
  - the label is delivered to the customer, and
  - the customer applies the label to the postal item.

25

36. A method according to any of claims 33-35, wherein the payment step comprises the steps of:

- the customer enters a credit card into a credit card reader,
- the control unit communicates with a remote computer being able to validate credit
- 30 cards over a data communication network so as to validate the entered credit card, and
- the control unit accepts payment with the credit card in case it is found to be valid.

37. A method according to claim 36 and further comprising the following steps:

- the control unit communicates with a remote computer being able to charge credit
- 35 card accounts over a data communication network, and

the control unit initiates charge of the account related to the entered credit card so as to perform a payment procedure.

38. A method according to any of claims 33-37 and further comprising the following steps:  
5 the control system allocates a unique identification code to each of the postal items being checked in at the system, and

the control system communicates the unique identification code and the corresponding valid delivery address of each of said postal items to a remote computer system over a data communication network.

10

39. A method according to any of claims 33-38 and further comprising the following step:  
the system provides a machine-readable code to be attached to each of the postal items being checked in at the system.

15 40. A method according to any of claims 33-39 and further comprising the steps of  
turning a cylinder shell part by means of drive means controlled by the control unit about a substantially vertical axis of symmetry of said cylinder shell part so that an opening defined therein is aligned with an opening defined in a front plate part that is fixedly arranged,

20 entering the postal item through said openings into an interior cavity defined by the cylinder shell part,

turning the cylinder shell part about an angle so that the opening defined in the cylinder shell part is aligned with one of at least one discharge stations and so that the opening defined in the front plate is closed by the cylinder shell part, and

25 discharging the postal item from the interior cavity to discharge station.

41. A method according to claim 40, wherein an endless belt is arranged pivotally about the same axis as the cylinder shell part and has a fixed angular position relatively to the cylinder shell part, the endless belt being movable in a direction perpendicular to the  
30 opening defined in the cylinder shell part and defining a substantially horizontal surface for supporting postal items so that the postal item is discharged from the interior cavity by driving the endless belt by means of drive means controlled by the control unit.

42. A method according to claim 34 and 41, wherein the weighting unit is arranged in the  
35 interior cavity for determining the weight of postal items placed on the endless belt.

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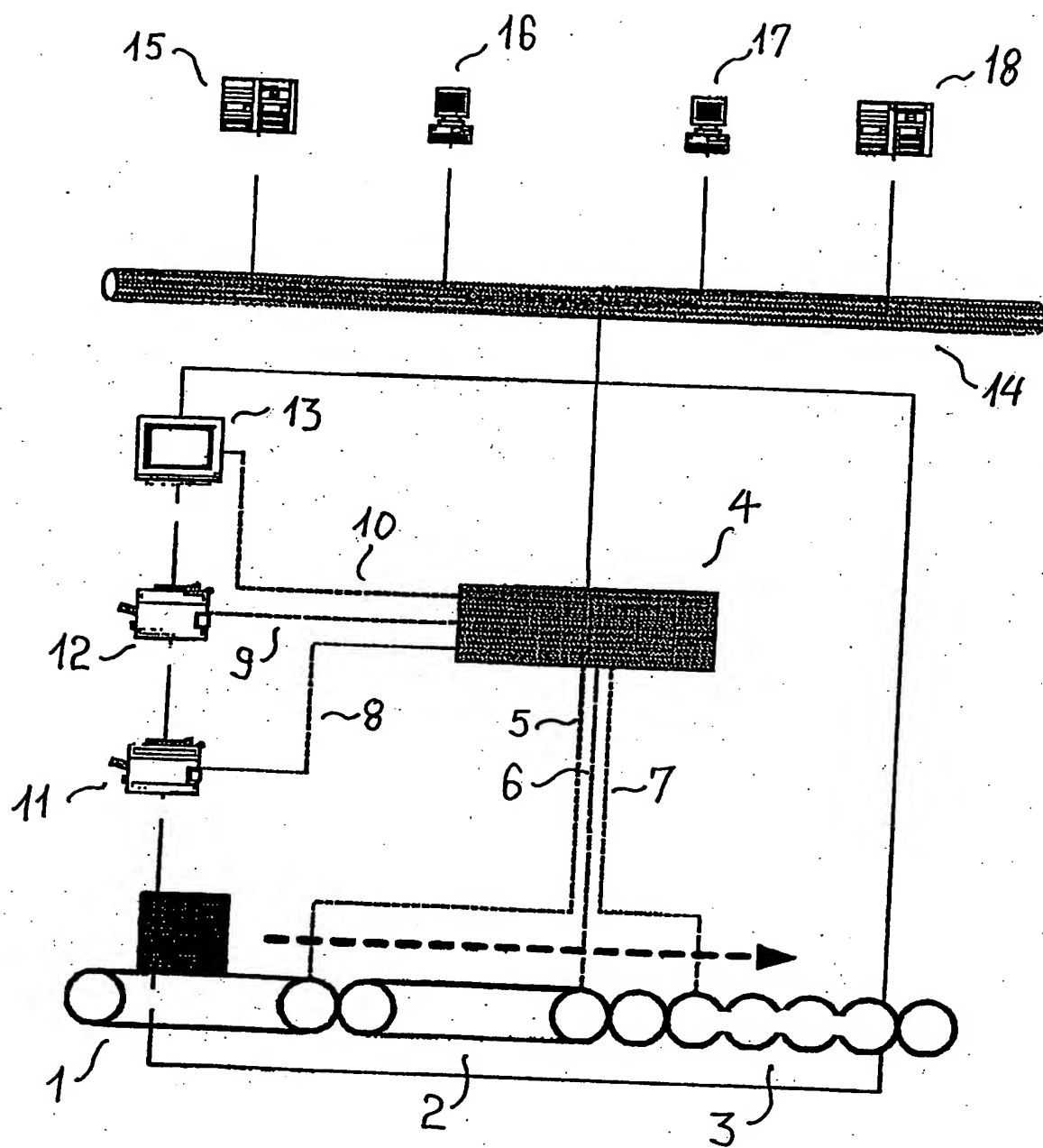


Fig. 1

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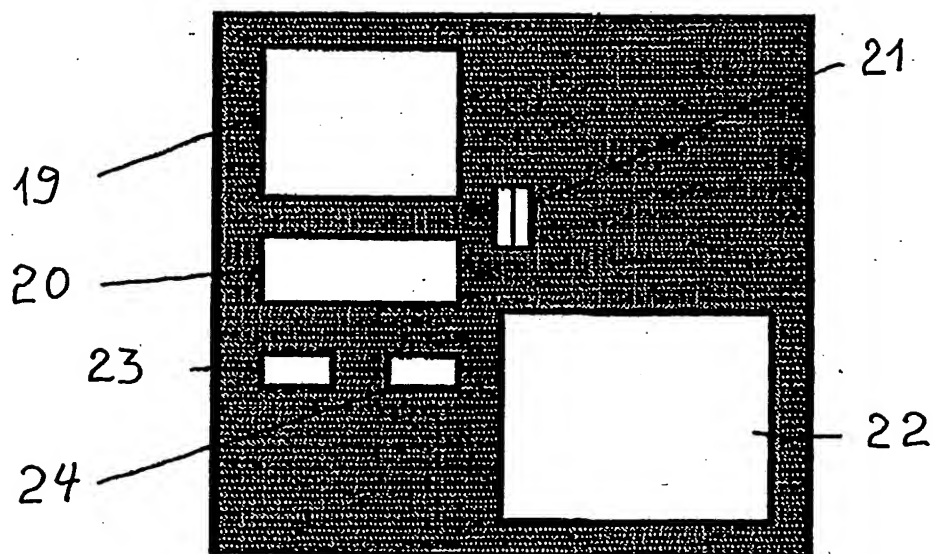


Fig. 2

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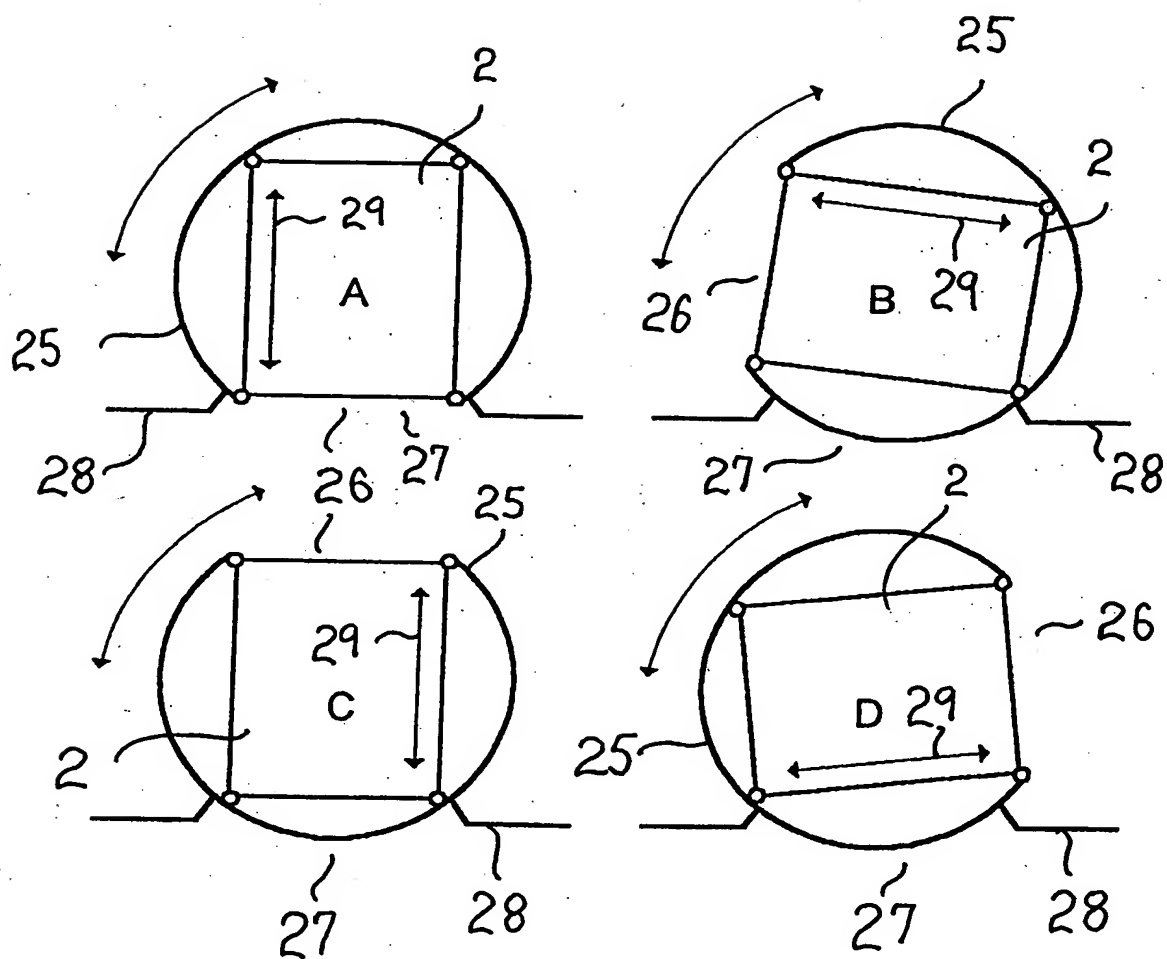


Fig. 3

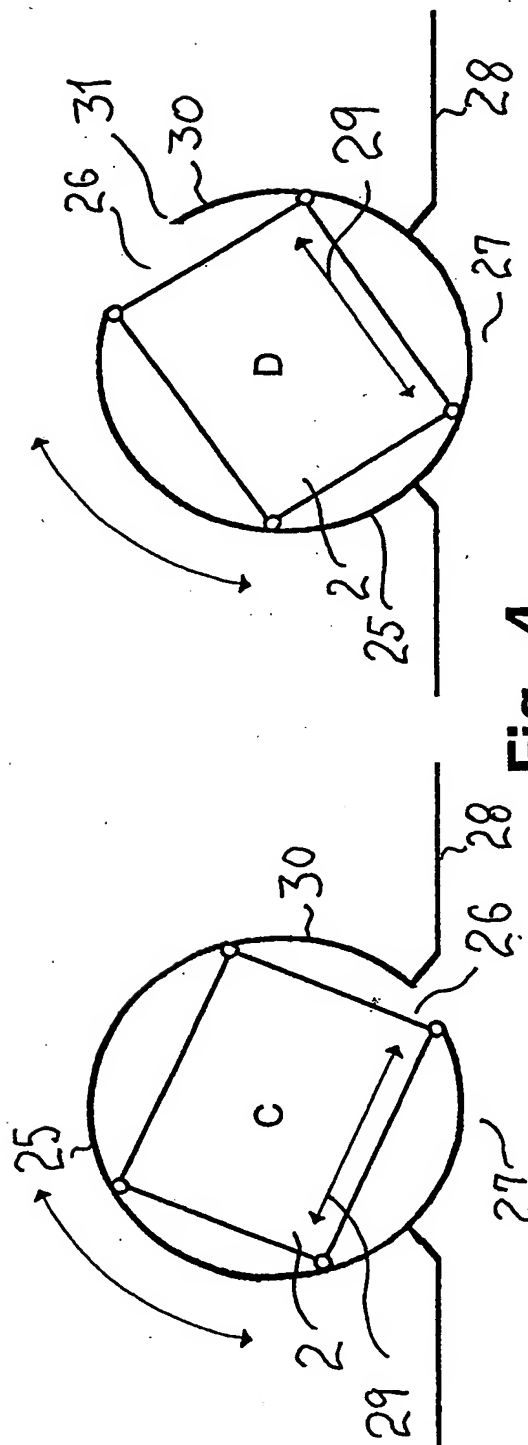
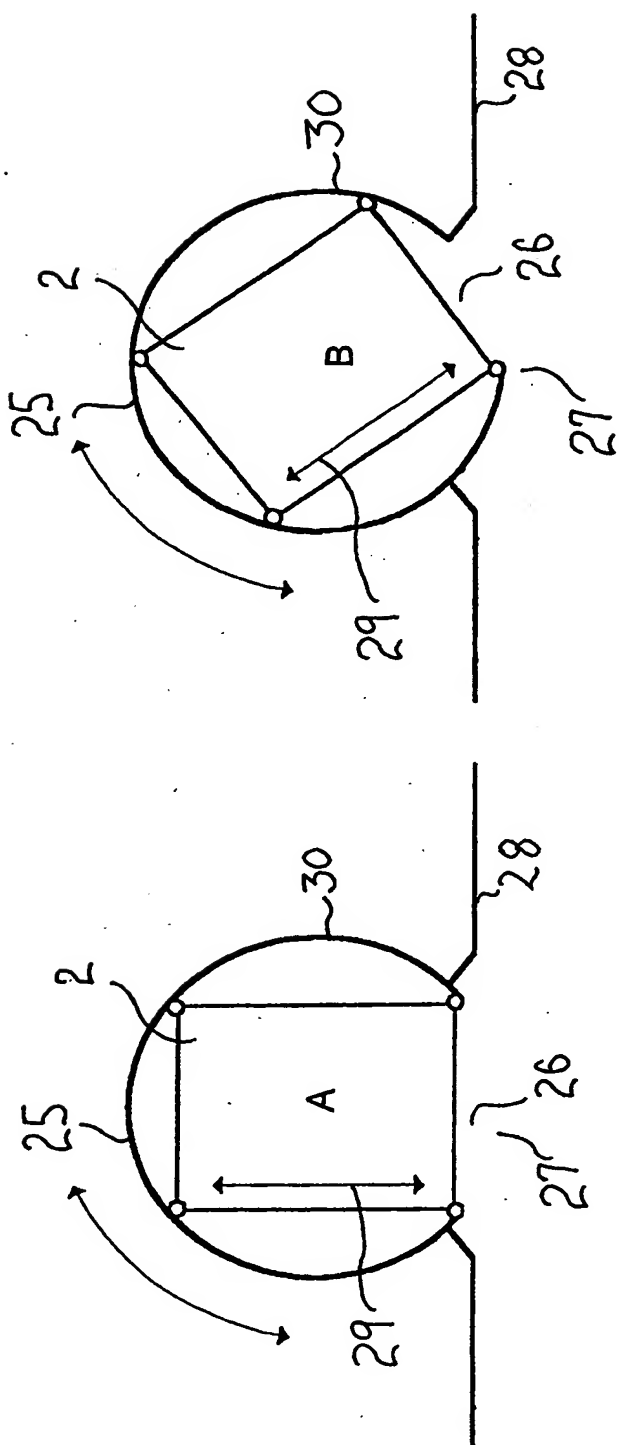


Fig. 4

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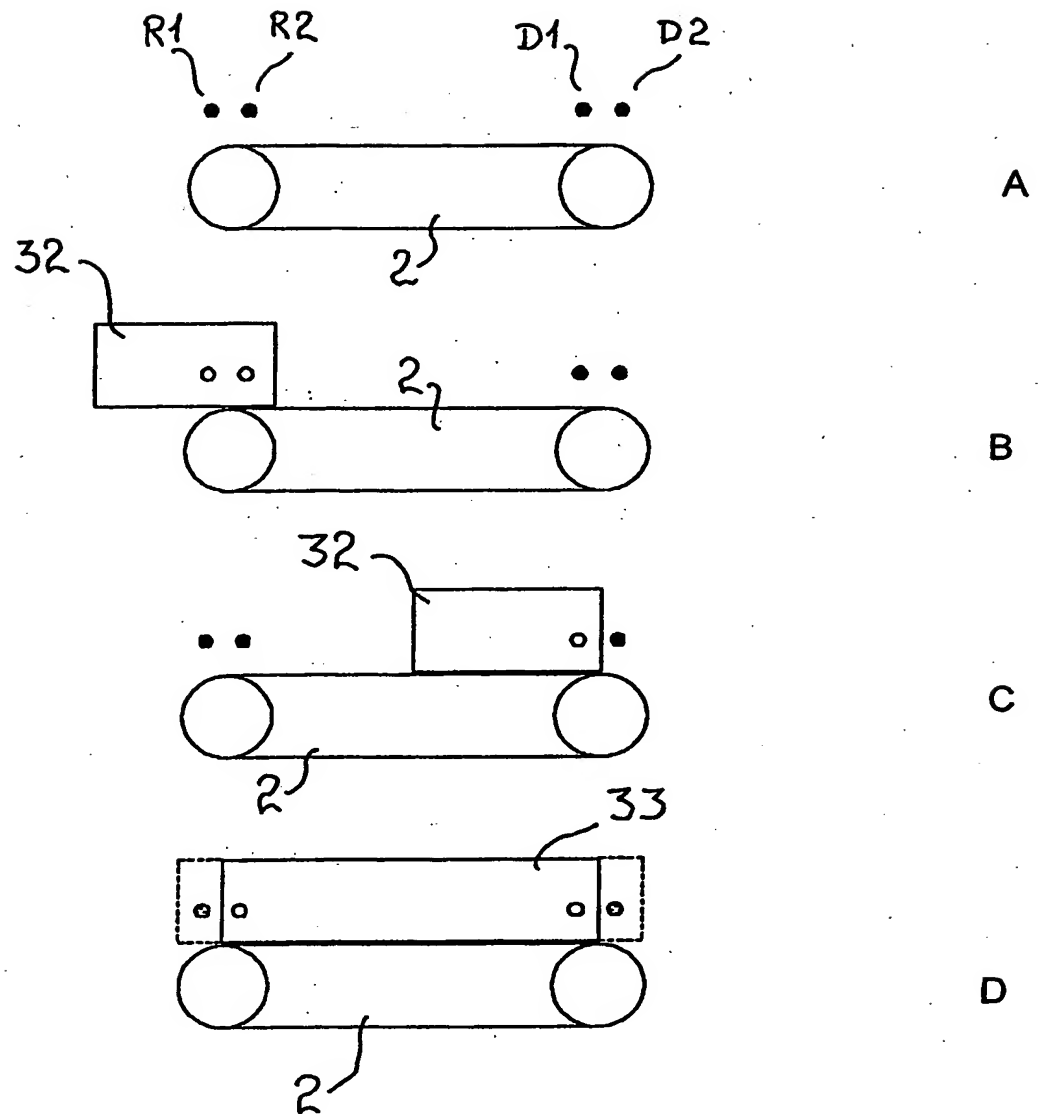


Fig. 5

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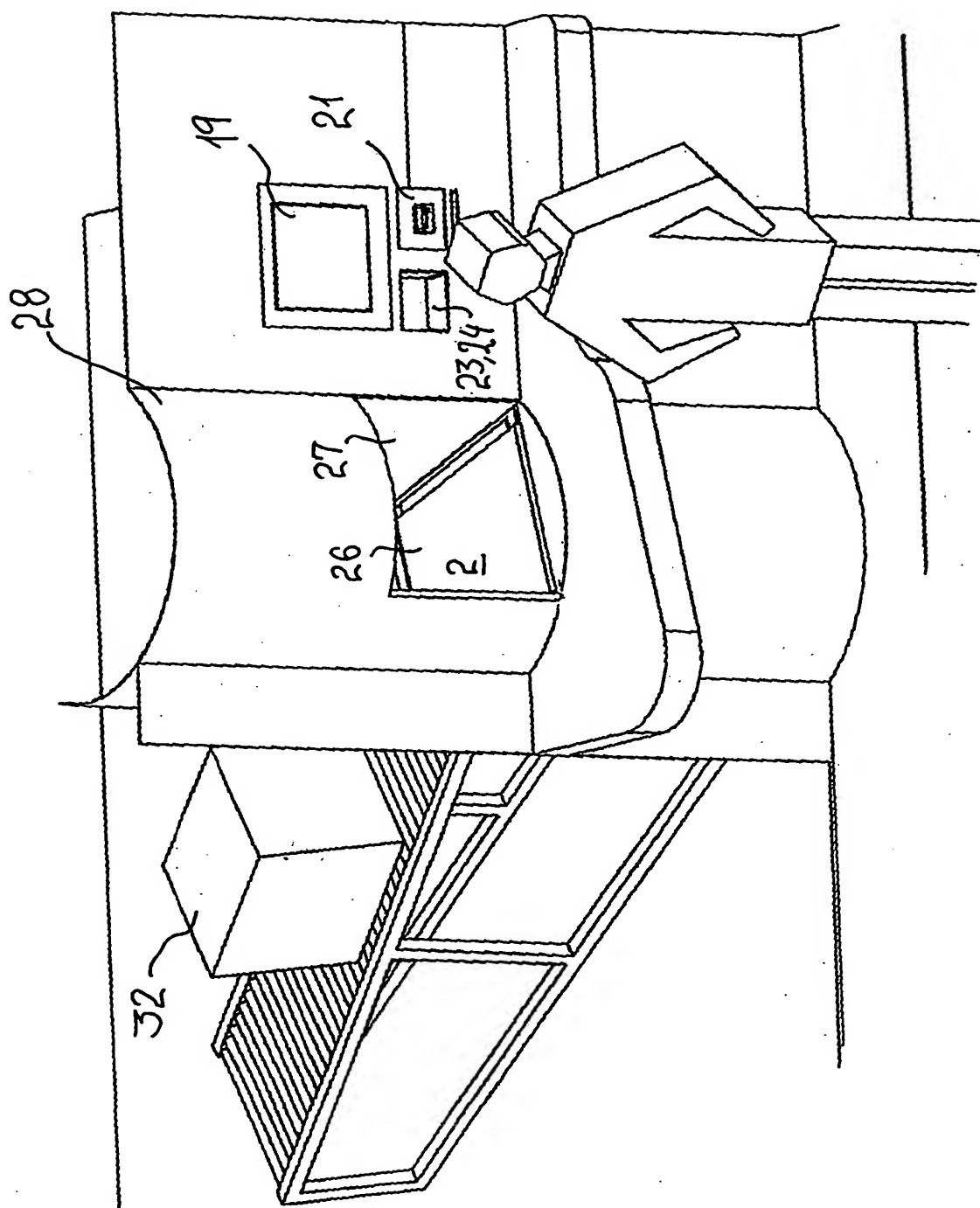
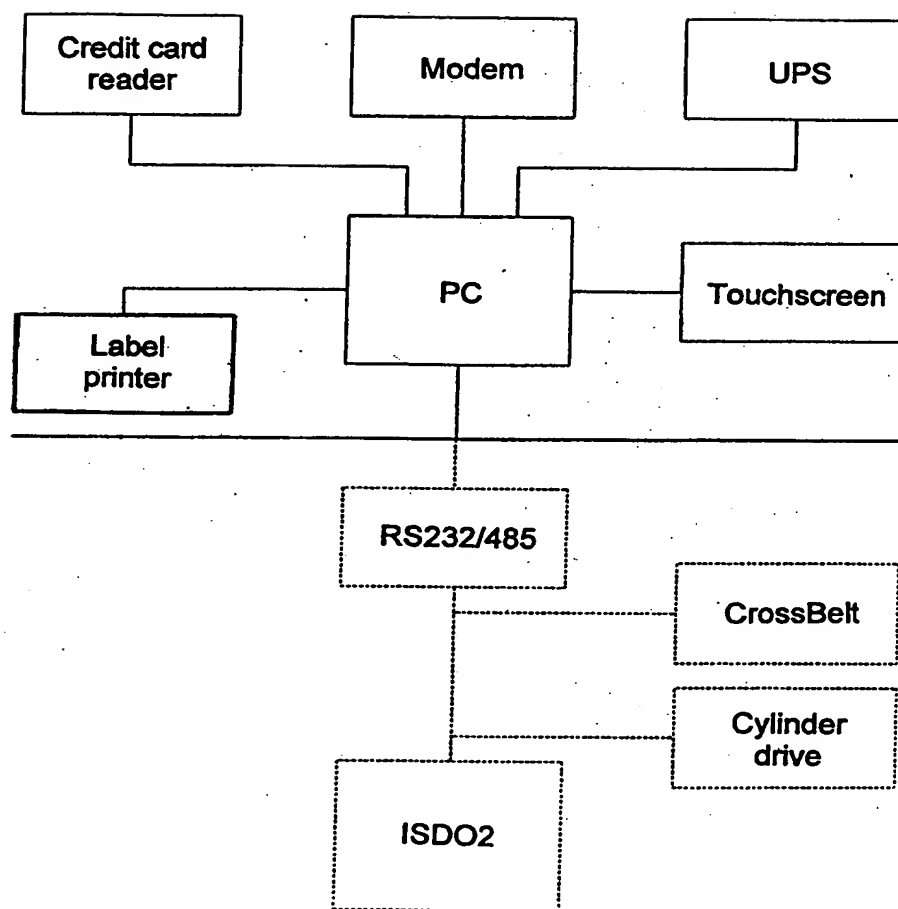


Fig. 6



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**Fig. 7**

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 99/00429

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G07F17/26 G07B17/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G07F G07B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92 17861 A (PI ELECTRONICS INC) 15 October 1992 (1992-10-15)	1,2,4, 6-11,17, 18
Y	page 2, paragraph 2; claim 1; figure 1	3,5, 12-16 19-42
A		
Y	US 5 313 404 A (WU SHENG J) 17 May 1994 (1994-05-17) cited in the application	3,12-16
A	claim 1; figure 1	1,2, 4-11, 17-42
Y	EP 0 338 108 A (JEN JACK) 25 October 1989 (1989-10-25)	5
A	claim 1; figure 1B	1-4,6-42
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

17 December 1999

Date of mailing of the international search report

12/01/2000

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Kirsten, K

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 99/00429

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 737 729 A (DENMAN DONALD E) 7 April 1998 (1998-04-07) claim 1; figure 1	1-42
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A	US 5 761 665 A (KAYE STEVEN M ET AL) 2 June 1998 (1998-06-02) claim 1; figure 5	1-42
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information on patent family members

International Application No

PCT/DK 99/00429

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